

## PATENT CLAIMS

1. A method of generating pressure pulses through a pressure pulse transmitting body (9) that is displaceable arranged in a chamber (2),  
5 by which the flow of a pressure fluid into and out of said chamber (2) is electromechanically controlled for the purpose of accomplishing pressure changes for the displacement of the body (9), by a pressure pulse generator that comprises
- said chamber (2), divided into a first and a second part (3, 4),
  - 10 • at least one operable valve body (12) for opening/interrupting a communication between the first and second parts (3, 4) of the chamber,
  - a first conduit (7) that leads between a high pressure source (5) and the first part (3) of the chamber (2),
  - 15 • a second conduit (8) that leads between a low pressure source (6) and the second part (4) of the chamber (2),
  - said body (9) being displaceably arranged in the second part (4) of the chamber (2) and being in contact, on one hand, with the pressure fluid in the chamber (2), and, on the other hand, with the environment and being spring loaded in a direction towards the chamber (2),
  - 20 • means for opening/interrupting the communication between the first part (3) of the chamber (2) and the high pressure source (5), and
  - means for opening/interrupting the communication between the second part (4) of the chamber (2) and the low pressure source (6), **characterized in that**
  - 25 • the communication between the high pressure source (5) and the first part (3) of the chamber (2) and the communication between the low pressure source (6) and the second part (4) of the chamber (2) are kept interrupted while the communication between the first and second parts (3, 4) of the chamber (2) is
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opened and a displacement of the body (9) out of the chamber (2) is accomplished,

- and the communication between the first and second parts (3, 4) of the chamber (2) is kept open for a re-establishment of a high pressure in the first part (3) of the chamber (2) while the body (9), by the spring load, is displaced back towards a retracted start position while the communication between the high pressure source (5) and the first part (3) of the chamber (2) and the communication between the low pressure source (6) and the second part (3) of the chamber (2) are kept interrupted.

2. A method according to claim 1, **characterized in that**, when said body (9) is on its way back to or is back in a maximally retracted start position, the communication between the first and second parts (3, 4) of the chamber (2) is interrupted, and the communication between the first part (3) of the chamber (2) and the high pressure source (5) is opened for a total re-establishment of the pressure in the first part (3) of the chamber (2).

20 3. A method according to claim 1 or 2, **characterized in that** the communication between the first and second parts (3, 4) of the chamber (2) is interrupted, and the communication between the high pressure source (5) and the first part (3) and the communication between the low pressure source (6) and the second part (4) are kept interrupted when said body (9) has reached a maximally projected position.

25 4. A method according to anyone of claims 1-3, **characterized in that** the communication between the second part (4) of the chamber (2) and the low pressure source (6) is opened while said body (9) is displaced into the chamber (2) and while the communication between

the first part (3) and the second part (4) of the chamber (2) is interrupted or is kept interrupted.

5. A method according to claim 4, **characterized in that** the communication between the low pressure source (6) and the second part (4) of the chamber (2) is kept opened during a final stage of the returning movement of the body (9) into the chamber (2), in order to permit the body (9) to return to a maximally retracted start position.
- 10 6. A method according to anyone of claims 1-5, **characterized in that** the opening/interrupting of the communication between the first and second parts (3, 4) of the chamber (2) is performed electromechanically by means of a solenoid-activated valve body.
- 15 7. A method according to anyone of claims 1-6, **characterized in that** the opening/interrupting of the communication between the first part (3) of the chamber (2) and the high pressure source (5) is performed electromechanically by means of a solenoid-activated valve body.
- 20 8. A method according to anyone of claims 1-7, **characterized in that** the opening/interrupting of the communication between the second part (4) of the chamber (2) and the low pressure source is performed electromechanically by means of a solenoid-activated valve body (12).
- 25 9. A method according to anyone of claims 1-8, **characterized in that** the pressure pulse transmitting body (9) forms or is connected to a spring loaded inlet or outlet valve (10) of a combustion engine, and that the height of lift of the valve (10) is controlled by a control of the pressure that is provided in the first part (3) of the chamber (2) through the high pressure source (5).

10. A method according to claim 3, **characterized in that** the time period during which the spring loaded inlet or outlet valve (10) is kept in an open position is controlled by a control of the time during which  
5 the communication between the first and second part (3, 4) of the chamber (2) is kept interrupted when said body (9) is in its maximally projected position.
11. A pressure pulse generator, comprising  
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  - a pressure pulse transmitting body (9),
  - a chamber (2), divided into a first and a second part (3, 4),
  - a first conduit (7) that leads between a high pressure source (5) and the first part (3) of the chamber (2),
  - a second conduit (8) that leads between a low pressure source (6) and the second part (4) of the chamber (2),

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  - said body (9) being displaceably arranged in the second part (4) of the chamber (2) and being in contact with, on one hand, a pressure fluid in the chamber (2), and, on the other hand, with the environment and being spring loaded in a direction towards  
20 the chamber (2),
  - **characterized in that** it comprises
  - means (26, 27, 12, 13) for opening/interrupting the communication between the first part (3) of the chamber (2) and the high pressure source (5), and means (26, 27, 12, 15)  
25 for opening/interrupting the communication between the second part (4) of the chamber (2) and the low pressure source (6), and
  - an operable valve body (12) for opening/interrupting the communication between the first and second parts (3, 4) of the chamber (2).  
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12. A pressure pulse generator according to claim 11, **characterized in that** the operable valve body (12) is a solenoid-activated valve body.

5     13. A pressure pulse generator according to claim 11 or 12, **characterized in that** the means (26, 27, 12, 13) for opening/interrupting the communication between the first part (3) of the chamber (2) and the high pressure source (5) comprises a solenoid-activated valve body (12).

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14. A pressure pulse generator according to anyone of claims 11-13, **characterized in that** the means (26, 27, 12, 15) for opening/interrupting the communication between the second part (4) of the chamber (2) and the low pressure source (6) comprises a solenoid-activated valve body (12).

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15. A pressure pulse generator according to anyone of claims 11-14, **characterized in that** the valve body (12), that is used for opening/interrupting the communication between the first and second parts (3, 4) of the chamber (2) also forms a valve body of the means for opening/interrupting the communication between the first part (3) of the chamber (2) and the high pressure source (5).

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16. a pressure pulse generator according to anyone of claims 11-15, **characterized in that** the valve body (12) that is used for opening/interrupting the communication between the first and second parts (3, 4) of the chamber (2) also forms a valve body of the means (26, 27, 12, 15) for opening/interrupting the communication between the second part (4) of the chamber (2) and the low pressure source (6).

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17. A pressure pulse generator according to anyone of claims 11-16,  
**characterized in that** the means (26, 27, 12, 13) for open-  
ing/interrupting the communication between the first part (3) of the  
chamber (2) and the high pressure source (5) comprise a portion with  
5 a reduced circumference or an opening in the pressure pulse trans-  
mitting body (9), said portion being positioned in order to permit a  
communication when said body (9) is adjacent to or in a start posi-  
tion in which it is maximally retracted into the chamber (2).
- 10 18. A pressure pulse generator according to anyone of claims 11-17,  
**characterized in that** the means (26, 27, 12, 15) for open-  
ing/interrupting the communication between the second part (4) of  
the chamber (2) and the low pressure source (6) comprise a portion  
that has a reduced circumference or an opening in the pressure pulse  
15 transmitting body (9), said portion being positioned for the purpose of  
opening for a communication when said body (9) is closed to or in a  
start position in which it is maximally retracted into the chamber (2).
19. A pressure pulse generator according to anyone of claims 11-18,  
20 **characterized in that** the first part (3) of the chamber (2) has a vol-  
ume that is adapted such that the high pressure fluid that is gath-  
ered therein is to act as a pressure fluid spring, the triggering of  
which results in a displacement of the pressure pulse transmitting  
body (9) from a maximally retracted position to a projected position  
25 against the spring load that acts on said body (9) in an opposite di-  
rection.
20. A pressure pulse generator according to anyone of claims 11-19,  
**characterized in that** it comprises a control unit with a computer  
30 program for controlling the means for opening/interrupting the com-  
munication between the first and second parts (3, 4) of the chamber  
(2) and between the first part (3) of the chamber (2) and the high

pressure source (5) and between the second part (4) of the chamber (2) and the low pressure source (6) in accordance with anyone of claims 1-10, based upon an information of the position of a piston that operates in the combustion chamber of a piston engine.

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21. A piston engine with a valve for an introduction or discharge of air or an air/fuel mixture to a combustion chamber, **characterized in that** it comprises a pressure pulse generator according to anyone of claims 11-20 for operating said valve.

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22. A piston engine with a valve for the variation of the cylinder volume of a combustion chamber in a combustion engine, said piston being arranged displaceably back and forth in a cylinder that is connected with the combustion chamber, **characterized in that** it comprises a pressure pulse generator according to anyone of claims 11-20 for operating said piston.